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ABSTRACT

Intended for both preservice and inservice teachers at all levels, the inservice workshop detailed in this report focuses on the computer as an educational tool that can be utilized without gaining an expertise in the inner workings and technicalities associated with the machinery. Related equipment and terminology is introduced informally to facilitate the hands-on experience, but historical and technical aspects of the microcomputer are not covered. The 2-hour session described covers microcomputers and their practical applications for instruction. This session is organized according to the following topics: computer hardware and program disks (30 minutes); the computer as a practical tool for instruction (60 minutes); and using the computer creatively (30 minutes). Goals and objectives for the workshop are given: (1) teachers will be able to identify input-output devices associated with the operation of a microcomputer; (2) teachers will be able to identify each mode of computer-assisted instruction and name at least one classroom application for each; and (3) teachers will be able to recognize some of the particular characteristics of three of the most common programming languages used in today's schools. Information on the content to be covered is provided for each topic, together with suggestions for handouts and/or activities; an annotated list of eight suggested readings is also provided. The concluding discussion notes the need for qualified personnel to assist teachers in areas covered in this workshop, and the need for ongoing education for teachers to improve their computer skills and alleviate their anxieties. Thirteen references are listed. (DJR)

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AN IN-SERVICE: MICROCOMPUTERS AND THEIR PRACTICAL APPLICATION LEVELS IN THE EDUCATIONAL PROCESS

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MICROCOMPUTERS AND THEIR PRACTICAL APPLICATION LEVELS IN THE EDUCATIONAL PROCESS

Introduction

It has already been projected that in the first part of the 21st century, 90% of the work force will be performing jobs involving computer knowledge and/or usage (Zorger, 1982.). Thus, serious consideration has been given to the type of educational and technological background expected of students who must enter the work force. As one might suspect, valid questions have arisen among educators because of the pervasiveness of these microcomputers in our society. For example, educators in states such as Rhode Island and Texas have implemented required computer literacy courses in their curricula, while other states are just considering recommendations (Spain, 1984.). However, preservice teachers in varied regions who have already enrolled in a degree plan prior to the implementation of such state mandates or these considerations are finding themselves largely responsible for developing their own computer awareness and literacy, to varying extents.

Rationale for a Workshop for Preservice and In-service Teachers

Since its inception in 1959, the chip or integrated circuit, has advanced technological capacity in quantum jumps. Some chips are huge information storers, or memory chips; others combine memory with logic to produce a microprocessor, which is virtually a computer on a chip. Chips are becoming cheaper and more powerful every year, pervading seemingly every aspect of modern life. In 1981 alone, more than 800,000 microcomputers were sold to people who neither knew nor needed to know how they worked because the chip

made them so easy to use (Boraiko, 1982.). It is for this reason that computer awareness has been and still is a very valid concern. Rod A. Scher (1984) said:

> Computer literacy is a familiarity with a device that enhances one's ability to live in and cope with the modern world...This does not mean, however, that students [teachers] should acquire the ability to program, but rather the ability to manipulate computer technology. (p. 41)

Ted Detjen (1984) also extends the attitude of practical, rather than technical aspects of computer literacy: "The computer is a tool. I don't believe kids [teachers] need to know about computer machinery to make it work for them any more than they need to know about the inner workings of a telephone or a car" (p. 43). However, given these perspectives, what do we know about the effects of this focus upon computer literacy with regard to preservice teachers?

According to research done in 1983, locus of control was a factor in determining whether or not an education major would approach the area of computer literacy and how they fared in some areas of testing. For example, Carol A. Carrier and Judith L. Lambrecht (1984) indicated that

> Education majors with internal locus of control as measured by Rotter's Scale had higher levels of computer awareness than those with external locus of control...[Similarly,] education majors with a field independent cognitive style had higher scores on tests of programming ability and technical knowledge than those with a field dependent cognitive style. However, on tests items dealing with

societal issues of computing and methods of instructional usage, field dependents scored as high as field independents. (p. 18)

Earlier research also indicated that stress levels were increasing for preservice teachers as they began to feel a greater need to establish some level of computer awareness. A survey of preservice teachers taken in 1979 and again in 1981 determined that anxiety levels regarding computer usage were indeed higher in the later survey. This research suggests that beginning teachers are in fact feeling more pressure to become computer literate (Carrier & Lambrecht, 1984.). Thus, the need for appropriate workshops or in-services becomes more apparent with such findings. Teachers also need to be computer literate to accommodate their students who are being raised in our emerging technological society. Several local school districts in the Dallas-Fort Worth Metroplex, for example, have requested or are using these ideas for related in-services.

In-service/Workshop: Suggestions for Preservice & In-service Teachers (all levels)

Introduction

The computer is a tool that can be utilized to facilitate the teaching/learning process without gaining an expertise in the inner workings and technicalities associated with the machinery. The mastery of knowledge concerning the historical and technical aspects of the microcomputer will be left largely up to the individual. An informal introduction of related equipment and certain terminology will obviously be necessary to facilitate the hands-on experience. However, the major impetus will be directed toward practical usage.

Content Area: Microcomputers and their practical application levels in the educational process.

Time Block: 2 hours.

Teacher Population: All levels, both preservice and in-service.

Recommended Number for Attendance: 10-14, in a laboratory situation, working in groups of 2.

Goals/Objectives

1. The preservice/in-service teachers will be able to identify the various input/output devices associated with the operation of a microcomputer.
2. Given the various modes of computer-assisted instruction, the teachers will be able to identify each and name at least one classroom application for each.
3. Teachers will be able to recognize some of the particular characteristics of three of the most common programming languages utilized in today's schools.

Coverage: Computer Hardware & Program Disks

Time Allocation: 30 minutes

The teachers will need an introduction to the external devices associated with the hardware of a microcomputer, but also adequate descriptions. Perhaps the physical labelling of the computer components in the lab would help with the demonstration. Any clearly designated drawings or photographs of the various input/output devices would be appropriate for handouts during this phase. The instruction regarding the care and handling of a diskette is a

necessity in conjunction with this demonstration because the teacher will be given every opportunity for hands-on experience during this in-service. The opportunity for a brief description of what a program is--a set of instructions for the computer to follow, would be helpful. The teachers should be able to load a disk into a disk drive properly and locate the power switch after a demonstration.

Suggestions: Two excellent handouts can be found in Electronic Learning's Workshop In-Service, Vol. 3, Sept. 1983, Part I, SkillsMasters 4a & 6a.

Coverage: The Computer as a Practical Tool for Instruction

Time Allocation: 60 minutes

What are some of the most common program uses available to teachers today to enhance instructional input and individualize learning? Typically, word processing programs such as the Bank Street Writer are often utilized. More recently developed are the Talking Textwriter, which reads aloud through voice synthesization whatever the pupil writes; and the LogoWriter, which allows for programming and word processing on the same screen ("Using Computers," 1986). Programs such as these have a wide variety of application levels with regard to language arts and composition. Drill and practice is another category of software that has commonly found its way into the classroom. Students often find routine drills highly motivating when they can be accomplished via computer. For example, consider shooting down "aliens" in Alien Addition over doing sums with pencil and paper. For students who need extra help to learn a skill or concept, state mandated tutorial programs have been developed.

Tutorial computer programs for use in this capacity offer feedback to the student and suggestions for more constructive ways of dealing with a question when answered incorrectly. Simulations such as Lemonade Stand give students the experience of starting a business vicariously with the resultant consequences determined by their own decision-making and problem-solving processes.

Since problem solving is another pertinent area to be addressed in today's educational environment, it is important to note at this introductory level the potential uses of programming, expecially when working with gifted and talented children (Nazarro, 1981.). With regard to these and other exceptional children, there is a vast amount of information to be accessed through public data bases as well. A modem can link even a home-bound pupil to knowledge (Naiman, 1985.).

Suggestions: Each computer station in the lab needs to feature at least one program from the following categories: word processing, drill and practice, tutorial and simulation. From this arrangement, the preservice or in-service teachers can get an idea of what's commercially available to them. Participants should be encouraged to exchange software or to move among the various stations for a more complete observation. Be sure to open the floor for comments and discussion regarding the program materials with which they have interacted. Ask them to note particular strengths or weaknesses they feel might warrant consideration when selecting or using software in their own or potential classrooms. The ideas have been used in the local districts, previously mentioned, with success.

Coverage: Using the Computer Creatively

Time Allocation: 30 minutes

In keeping with the basic idea that the preservice and in-service teachers can become manipulators of computer technology, the feeling ensues that there should be at least topical exposure to the most common programming languages expected to be utilized in the school setting--BASIC, LOGO, and PASCAL (Anderson, et. al., 1983.). For example, programming involves being able to use computer technology creatively. Obviously, fostering the creative development of students is a desired educational outcome. For students who have already had unlimited exposure to computers, programming may be the next step for more challenging learning experiences. This is not to mention the problem-solving skills and thinking strategies that are brought into focus for any student attempting to create a program.

Each programming language previously mentioned has distinct features that set it apart from the others. LOGO is a programming language designed with children in mind, (Endreweit, 1985.). According to Lombardi (1983), BASIC is considered to be relatively simple and easily understood by those whose experience with computing is limited. PASCAL, on the other hand, is more sophisticated in its implementation; but "for computer literacy, [italics added] you really don't have to know any computer languages" (p. 60).

Suggestions: A supporting activity should not have as its intended result the proficient use of a programming language. A handout lending support to this approach can be found in Electronic Learning's Workshop In-Service, Oct. 1983, Part II, SkillsMaster 5b.

Suggested Readings for In-service/Workshop

Alesandrini, K.L. (1983). How can educators spell relief? C-O-M-P-U-T-E-R. Educational computer magazine, 3(5), 32-35.

This article is a compact and useful treatment of various terminology and situations sure to be encountered by anyone approaching computers in the field of education. Some of the areas addressed include: courseware, output, memory, programming, tutorials, evaluation, and others.

Chan, J.M., & Korostoff, M. (1984). Teachers' guide to designing classroom software. Beverly Hills, CA: Sage Publications, Inc.

As the title suggests, this is a guidebook for designing educational software. Their suggestions for program design are based on psychological research. The areas of publishing, marketing and selling teacher-designed courseware are also addressed.

Christie, L.G., & Curry, J.W. (1983). The ABCs of microcomputers: A computer literacy primer. Englewood Cliffs, NJ: Prentice-Hall, Inc.

This book features an easy-to-understand introductory lesson regarding peripherals with a related glossary of terms. A listing of specific uses for the microcomputer in the classroom is given special treatment in Chapter 3.

Coburn, P., Kelman, P., Roberts, N., Snyder, T., Watt, D., & Weiner, C. (1982). Practical guide to computers in education. Reading, MA: Addison-Wesley Publishing Company.

This book is a valuable resource tool designed with teachers in mind. Various photographs of related computer equipment are featured throughout the text. An appendix is provided for computer comparison. An annotated bibliography is also provided, covering several computer areas. The resource section has its own table of contents providing coverage for topics such as research, journals relative to computing, and certain projects.

Cromer, J. (1984). High tech schools: The principal's perspective. Reston, VA: National Association of Secondary School Principals.

This booklet comes from the administrative perspective achieved at the EPCOT Symposium in 1983 made up of distinguished members from the fields of "technology, communications, education, and trend analysis...". It offers constructive guidelines for meeting the implications educators must face in shifting job markets and for further professional development.

Suggested Readings, continued

Hofmeister, A. (1984). Microcomputer applications in the classroom. New York, NY: CBS College Publishing.

This illustrative sourcebook gives extensive treatment to a wide variety of areas affected by the microcomputer. It runs the range from the history of micros through cyberphobia to courseware evaluation. Each chapter ends with a section of multiple-choice questions and areas featuring readings, resources and references. At the beginning of each chapter, the author has listed the contents being covered.

Logsdon, T. (1982). How to cope with computers. Rochelle Park, NJ: Hayden Book Company, Inc.

This book offers a refreshing point of view. The author's humorous, yet psychologically-based approach to coping with computers offers a nice change of pace for dealing with an area that is often tension-charged. Each chapter ends with a list of books for suggested readings.

Lombardi, J.V. (1983). Computer literacy. Bloomington, Indiana: Indiana University Press.

This book offers a realistic view of computer literacy for the purposes of this in-service. It was designed for adults with at least a high school or possibly a college education. The text is very readable and clearly written. A glossary of common computer terminology is also included.

Conclusions

Underlying learning theories and research lending support to this in-service give it particular pertinence in today's educational milieu. The concept of transfer, which involves overlapping an already learned skill behavior with a new skill behavior to enhance learnings and reduce fragmentation, is of primary importance when considering the means used for communicating with a microcomputer. Lateral transfer refers to transfer at a similar level of difficulty while vertical transfer refers to a higher difficulty level. The use of the keyboard requires the teachers to bring prior skill knowledge with them, probably obtained in a typing course. As a result, they experience lateral transfer while learning to interact with the computer via the keyboard. However, this does little to prepare them for the vast number of uses for a microcomputer. Thus, the need for qualified personnel to assist teachers in areas of the in-service is more obvious, particularly in areas with potential vertical transfer such as BASIC, LOGO, and PASCAL.

Another theorist, Kurt Lewin, deals with the individual's perception of a situation being that person's own "cognitive field" and the resulting behavior or behaviors. The purpose of this in-service is to enlarge the preservice and in-service teachers' cognitive fields by helping them to "approach" the situation of computer literacy rather than to "avoid" it. Similarly, levels of motivation are always an area of concern in any educational environment. According to Ernest L. Lewis and Robert R. Reilly (1983), "if there is any one principal that finds universal acceptance, it is the notion that motivation leads to learning and that without proper motivation, learning will either not occur or be minimal" (p. 270).

Hopefully, the general ideas in this in-service will provide educators with initial directions for preservice and in-service teachers. In spite of the use of computers and the educational technology "revolution", the authors have noted the lack of minimal skills related to computer literacy and varying anxiety levels with teachers, particularly in the local school districts. Although these concerns are minimized with workshops or in-services for this target population, the primary need for ongoing education with these educators is still apparent.

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